IMPACT OF BUTEYKO BREATHING TECHNIQUE WITH PROGRESSIVE, REGRESSIVE AND FLUCTUATED RESISTANCE TRAINING ON SELECTED PHYSICAL AND PHYSIOLOGICAL VARIABLES AMONG NATIONAL HANDBALL PLAYERS

SHORT SYNOPSIS

Submitted in partial fulfilment of the requirement of the degree of

DOCTOR OF PHILOSOPHY

to

Lakshmibai National Institute of Physical Education,
NERC, Guwahati, Assam

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Certificate

I hereby declare that the short synopsis **"Impact of Buteyko Breathing Technique with Progressive, Regressive and Fluctuated Resistance Training on Selected Physical and Physiological Variables Among National Handball Players"** being submitted in partial fulfilment of the requirement for the degree of Doctor of Philosophy in Physical Education under faculty of Physical education of Lakshmibai National Institute of Physical Education, NERC, Guwahati, Assam during the academic year 2023-24.

It is Bonafide record of original work carried out under the supervision of Dr. Shailesh Kumar Singh and has not been submitted in full or part to any other university or institute for a degree or diploma. Further it is certified that the short Synopsis is plagiarism-free, and the proof has been submitted.

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ABSTRACT

This study investigates the combined effects of the Buteyko Breathing Technique and three distinct resistance training modalities—progressive, regressive, and fluctuating—on selected physical and physiological variables among national-level handball players. The research aims to contribute to the understanding of how respiratory techniques can enhance athletic performance when integrated with strength-based training. Forty (N=40) male handball players, aged 20–25, were randomly assigned to four equal groups: Group I (Buteyko + progressive resistance), Group II (Buteyko + regressive resistance), Group III (Buteyko + fluctuated resistance), and Group IV (control group with standard handball training). Over 12 weeks, experimental groups followed structured training involving core resistance exercises—bench press, back squats, and deadlifts—paired with Buteyko breathing sessions, while the control group continued only with routine handball practice.

Physical variables measured included maximum strength, explosive power, and muscular strength endurance. Physiological variables included Forced Expiratory Volume in one second (FEV1), Forced Vital Capacity (FVC), and the FEV1/FVC ratio. Standardized pre- and post-tests, including 1RM testing, sit-ups, standing broad jump, and spirometry, were used for evaluation. Data analysis was conducted using Analysis of Covariance (ANCOVA) to assess inter-group differences, with significance set at the 0.05 level. Where applicable, the Least Significant Difference (LSD) test was used for post hoc comparisons. The study is expected to provide valuable insights into how combining controlled breathing with varied resistance training protocols influences performance and respiratory health in elite athletes.

Keywords: Buteyko Breathing Technique, Resistance Training, Physical Performance, Respiratory Training, Strength Development, Explosive Power, Muscular Endurance, Pulmonary Function, Spirometry, Athletic Performance.

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1 INTRODUCTION

The maintenance of healthy health is contingent upon daily physical activity participation. Years of daily practice in a chosen range of strenuous physical activities have contributed to the high degree of physical fitness. A biological concept states that structure determines function and function builds structure. Vigorous exercise is necessary for human growth and development. The ability to do daily tasks efficiently depends on having healthy muscles that are strong and resilient. It is true that to build a muscle, it must be overloaded. (Govindarajulu, 1991).

Whether they realize it or not, every human being engages in some form of physical activity or sports throughout their lives. For various people, this activity may take on different shapes. Walking, jogging, cycling, working in a factory, playing games and sports, and so on are some examples. A regular exercise regimen has a significant impact on a person's physical, physiological, and mental health.

Handball is a high-intensity team sport that demands a combination of strength, agility, endurance, and mental focus. To meet these demands, integrating resistance training and breathing exercises into an athlete’s routine can significantly enhance performance. Resistance training, particularly when tailored to the functional movements of handball—such as throwing, jumping, and sprinting—can improve muscle strength, power, and joint stability (Hermassi et al., 2011). Exercises like weighted squats, push presses, and plyometric drills mimic in-game actions and help reduce injury risk by strengthening the musculoskeletal system (Chaouachi et al., 2009). When resistance training is combined with controlled breathing exercises, athletes experience better neuromuscular coordination, improved oxygen utilization, and reduced fatigue during intense gameplay (Jerath et al., 2006). Breathing techniques such as diaphragmatic breathing and rhythmic breathing during exertion enhance core stability and promote a calm, focused state of mind, which is crucial in high-pressure match scenarios (Ma et al., 2017). Thus, a holistic training approach that incorporates both resistance and breathing exercises can lead to enhanced physical performance, faster recovery, and improved mental resilience in handball players.

BUTEYKO BREATHING: An Overview

The Buteyko Breathing Technique is originated from Russia by Dr. Konstantin Pavlovich Buteyko. Buteyko breathing is a type of relaxed slow breathing exercise with a hold followed by normal breathing pattern. Buteyko breathing helps in correction of normal pattern

of breathing.it also improves sense of control, improves respiratory rhythm. The breath holds and slow breathing of buteyko induces opening of blood vessels and airways. (Rashmi, 2018)

The Buteyko breathing improves various lung functions. It is used for treating various respiratory diseases such as asthma, sleep apnoea, anxiety, muscle cramping.

The principle behind the Buteyko Breathing Technique is that it corrects respiratory pattern by two techniques first is slow breathing exercise series and second is by breath hold or control pause. These techniques help in proper distribution of oxygen to body and removal of co2. (Dani, 2017).

Breath is the essence of life—it is our life force energy. Every function of the body relies on breath, and the absence of breath signifies the end of life. Practicing breath control in a proper and mindful manner can harmonize the body, mind, and spirit in remarkable ways, fostering overall well-being and inner balance (Rana, 2019).

Breathing exercises offer a wide range of physical and mental benefits. One of the key effects of deep breathing is the release of endorphins, which are natural painkillers produced by the body. These hormones not only help in reducing physical discomfort but also promote a general sense of happiness and relaxation.

In addition, breathing exercises improve blood circulation. As we breathe deeply, more oxygen enters the bloodstream, which enhances the delivery of nutrients and supports the removal of toxins from the body. This increased oxygenation also leads to higher energy levels, making the body feel more active and alert.

Practicing proper breathing also contributes to better posture. Deep breaths encourage the spine to straighten, which helps correct postural imbalances over time. Moreover, breathing has a direct impact on the body’s pH levels. By reducing stress, deep breathing lowers the acidity in the body, creating a more alkaline environment that supports better health.

Another essential function of breathing exercises is aiding in detoxification. By efficiently expelling carbon dioxide, the body is able to eliminate waste more effectively. Additionally,

deep breathing activates lymphatic flow, which is responsible for clearing out cellular waste, thus strengthening the immune system.

Breathing exercises further support digestion. Improved blood flow to the digestive organs enhances intestinal activity, leading to better nutrient absorption and smoother digestive processes. This also plays a role in accelerating the body's healing processes, as increased circulation and oxygen supply nourish tissues and promote recovery.

Lastly, the calming effect of conscious breathing cannot be overstated. Deep, rhythmic breathing soothes the nervous system, reducing anxiety and stress, and bringing a sense of peace to the mind and body. Practicing these exercises regularly can create a sustained sense of calm, focus, and overall mental clarity

UNDERSTANDING PROGRESSIVE, REGRESSIVE, AND FLUCTUATED RESISTANCE TRAINING

To build muscle strength, power, and endurance, resistance training is a systematic program that involves workouts against external resistance, such as free weights, machines, or body weight. By adjusting factors including intensity, frequency, and duration, it plays a crucial part in athletic conditioning, rehabilitation, and general fitness. (Baechle & Earle, 2008). Resistance training is crucial for enhancing neuromuscular efficiency, joint stability, and athletic performance because it is mainly anaerobic and allows for brief bursts of high force production. (Kraemer & Ratamess, 2004; Stone et al., 2000).

Progressive overload, which involves progressively increasing resistance to guarantee ongoing adaptation and muscle growth, is one of the fundamental ideas of resistance training. Athletes and clinicians alike frequently employ progressive resistance exercise, or PRE. Research has demonstrated that PRE efficiently increases muscle force production in a variety of demographics, such as the elderly and people recuperating from neurological or musculoskeletal conditions (Taylor et al., 2005). To completely comprehend its long-term impacts and how to convert advancements into everyday functioning duties, more research is necessary.

Alternative techniques that lessen the strain on healing tissues include regressive resistance training, in which a session starts with a maximal load that is progressively decreased (Behm et al., 2010). Likewise, by presenting fresh neuromuscular demands, variable resistance training, which alternates intensity rises and drops within or between training sessions, avoids

overtraining and promotes long-term improvement (Fleck & Kraemer, 2014).

In the end, resistance training is a very versatile method for improving general health, strength, and rehabilitative results. When prescribed and carried out appropriately, its use in athletic and clinical settings has shown significant physical benefits, whether through progressive, regressive, or fluctuated approaches (Ratamess et al., 2009; Westcott, 2012).

2 LITERATURE REVIEW

Cristea et al. (2008) The benefits of a combined sprint and strength training program on older sprint-trained athletes were investigated by the researcher. Eleven men, ages 52 to 78, participated in the trial and were randomized to either the training or control groups. After 20 weeks of sprint and strength training, the experimental group's maximal isometric and dynamic leg strength as well as their explosive jump performance improved. Nonetheless, no notable alterations were noted in the properties of muscle fibers, indicating that the enhancements in strength and explosive power were due to hypertrophic adaptations.

Arul et al., (2008) Researchers compared the effects of progressive and variable weight training on leg strength. For the study, 45 participants were divided into three groups: one for progressive weight training, one for variable weight training, and one for control. After 12 weeks of training, the findings showed that both training methods significantly improved leg strength when compared to the control group, with variable weight training being equally as successful as progressive training.

Venkatesan et al. (2012) The researcher conducted a study comparing the impact of Buteyko and Pranayama breathing techniques on the quality of life for people with asthma. A total of 120 volunteers were randomly assigned to the Buteyko, Pranayama, or control groups for a three-month period. Twice daily, they worked on their individual methods. Asthma quality of life improved more in the Buteyko group than in the Pranayama and control groups, indicating the benefits of Buteyko breathing for asthma management.

Romella (2014) investigated how well the Buteyko technique worked to improve school-age children's quality of life and asthma control. As measured by asthma control questionnaires and pediatric asthma quality of life assessments, children who used the Buteyko approach shown notable improvements in both asthma control and overall quality of life over the course of a three-week intervention period.

Reddy et al. (2015) examined how male athletes between the ages of 18 and 23 responded to three distinct complex training approaches: Regressive Complex Training (RCTG), Fluctuated Complex Training (FCTG), and Progressive Complex Training (PCTG) in terms of explosive power. Three experimental groups were randomly selected from among the 36 participants, and each group underwent a 12-week training regimen. Following ANCOVA analysis, the results showed notable increases in explosive power, with PCTG having the biggest impact when compared to FCTG and RCTG.

Kyoung Kim et al. (2019) looked at how elderly women's pulmonary function was affected when they combined breathing exercises with resistance training with elastic bands. Forty-five senior citizens participated in the study; the experimental group used elastic bands to do resistance workouts while incorporating particular breathing techniques. Forced vital capacity (FVC), forced expiratory volume (FEV1), and the FEV1/FVC ratio all showed notable improvements after six weeks, indicating that combining resistance training with breathing strategies improves respiratory function in older adults.

3 DESCRIPTIONS OF BROAD AREA

Physical Fitness

Frequent exercise helps us maintain our mental clarity for extended periods of time in addition to keeping our bodies in shape. Regular exercise will keep our minds from being fatigued. Additionally, it improves the body's blood circulation and gets us ready for a full day of hard work. Frequent exercise can also help prevent or detect chronic illnesses and other heart and lung-related conditions. Frequent physical activity strengthens the heart. The study claims that weight can be managed, and muscle mass can grow. (Ganesan, 2009).

People today are increasingly conscious of the value of physical education and physical fitness. The several bodily systems are well-conditioned when an individual is fit, allowing each system to play a part in efficient performance. Although it may not cover all the fundamentals, fitness provides a broad foundation for performance excellence. In addition to motor fitness, the special skills required for the activity must be had in order to perform exceptionally well in it (Bucher and Willets, 1964).

Training

Training is an exercise regimen intended to boost an athlete's energy levels and skill

sets for a specific competition. Training is the entire process of preparing a sportsman using various methods to improve performance. (Singh, 1984).

The most well-known methods for preparing athletes for effective performance and healthy living are training and conditioning. Only a meticulously designed program of progressive practice can achieve efficient performance by perfecting coordination, removing superfluous movements, achieving a goal with the least amount of energy, and conditioning the circulation and muscle structure to withstand the demanding demands placed on them without suffering damage. (Koubova and Guarente, 2003).

Sports Training

A pedagogical approach founded on scientific principles; sports training aims to prepare athletes for improved performance in sporting events. The fundamental method of preparing athletes is sports training. A pedagogical approach founded on scientific principles; sports training aims to prepare athletes for improved performance in sporting events.

Performance has undergone a revolution in recent years due to the drastic changes that have occurred. Careful observation and scientific investigation have served as the foundation for and driving force behind these new modifications to conditioning techniques. The updated program has yielded accurate and reliable data regarding the relative efficacy of various training techniques. We now have a better understanding of how the body's systems work during training and competition than we did in the past. The impact of medicines, food, attitude, warm-up, and other influencing elements have become better understood. Nearly every facet of conditioning and performance has been the subject of fresh research in recent years. (Jensen and Fisher, 1979).

Physiological Parameters

The study of how the human body functions is known as physiology. Hardly a science could be more crucial for the coach to be knowledgeable with, comprehend, and be able to use effectively. Exercise that stimulates the human body is a physiological fact. The overall effectiveness of our physiological processes increases when your entire body experiences consistent molecular activity, which puts a lot of strain on the heart, lungs, and muscles. For a healthy person, there is no scientific proof. However, the idea that frequent, intense exercise keeps hearts healthy and may prevent cardiovascular disease is now strongly supported by a wealth of data. The ability to perform more physical work is significantly

increased when the heart is physically healthy because it beats more slowly and pumps more oxygen. Those who maintain their fitness significantly increase their quality of life.

Physical Parameters

In sports training, physical parameters are the quantifiable elements of an athlete's physical state that can be enhanced by focused training. Strength, endurance, flexibility, speed, power, agility, and body composition are commonly included in these measures. Trainers can evaluate an athlete's present level of fitness and monitor their development over time by keeping an eye on these variables. Athletes can perform better in particular sports by concentrating on improving these physical characteristics. Individually designed training plans, healthy eating, and recuperation are essential for maximizing these physical characteristics, which enhances performance overall and lowers the chance of injury.

Training

"Systematic process of repetitive progressive exercise or work involving the learning process and acclimatization" is one definition of training. (Arnhein, 1985).

Sports training

A scientifically grounded educational approach, sports training aims to prepare athletes for improved performance in sporting events. (Singh, 1991).

Resistance Training

A methodical regimen of exercises against some resistance for the development of the muscular system is called resistance training.

Combined Training

According to Donald' A. Chu.(1998) Combined training matches pairs of exercises from two sources. In this study, it has been used with the combination of two different trainings i.e., hatha yoga and resistance trainings.

Progressive Resistance Training

Training exercises are a series of exercises designed to increase physical strength by having participants lift increasingly larger weights in accordance with a formula based on their starting maximal strength.

Fluctuated Resistance Training

A form of resistance training that frequently changes the load, increases or decreases from time to time.

Regressive Resistance Training

A type of active resistance training that promotes progressively lowering the resistance when muscles become tired.

Buteyko breathing

It involves a series of breathing exercises and practices aimed at normalizing breathing patterns, specifically by reducing the depth and frequency of breaths.

Strength

The capacity of a muscle or group of muscles to work against or overcome opposition is known as strength. (Singh, 1991).

Explosive Power

The ability of a muscle or group of muscles to produce the most force in the shortest amount of time, usually during quick, high-intensity movements, is known as explosive power.

Muscular Strength Endurance

The capacity of a muscle group to overcome or resist opposition for an extended period of time when fatigued or exhausted (Singh, 1991).

Physiology

Physiology is the scientific study of the functions and mechanisms in a living system. It focuses on how organs, tissues, cells, and biomolecules carry out the chemical and physical processes that support life. In simple terms, physiology explains how the body works.

Forced Vital Capacity (FVC)

Forced Vital Capacity (FVC) is a measure of lung function commonly used in pulmonary function tests (PFTs). It is a measure of how much air a person can firmly exhale after inhaling deeply.

Forced Expiratory Volume in one Second

Forced Expiratory Volume in One Second (FEV1) is a key measure of lung function obtained during pulmonary function tests (PFTs). It stands for the amount of air that a person may forcefully expel after taking a deep inhale during the first second of a forced expiratory maneuver.

FEV1/FVC (Ratio between Forced Expiratory volumes in one second And Forced Vital Capacity).

The Tiffeneau-Pinelli index, sometimes referred to as the FEV1/FVC ratio, is a metric used to evaluate lung function and identify respiratory disorders. The Forced Vital Capacity (FVC) determined during pulmonary function testing is divided by the Forced Expiratory Volume in One Second (FEV1).

4. OBJECTIVES OF THE STUDY

PROBLEM STATEMENT

Finding out how buteyko breathing with progressive, regressive, and fluctuating resistance affects specific performance factors in handball players—such as strength, explosive power, muscular strength endurance, FEV1 (forced expiratory volume in one second), FVC (forced vital capacity), and FEV1 / FVC (ratio between forced expiratory volumes in one second and forced vital capacity)—is the primary goal of the study.

RESEARCH OBJECTIVE

Numerous research combining different forms of resistance training with breathing techniques have already been conducted. The impact of buteyko breathing in conjunction with progressive, regressive, and fluctuating resistance training on certain physical and physiological variables in handball players has, however, received little research.

Therefore, the researcher set out to investigate the effects of buteyko breathing in conjunction with progressive, regressive, and fluctuating resistance training on a few physical and physiological indicators in handball players competing at the national level.

DELIMITATIONS

1) Forty (N=40) male handball players will be chosen as subjects to fulfil the study's objectives.

2) The subjects will be between the ages of 20 and 25.

3) The participants will be split into four groups of ten (n=10) at random. In Group I, the Buteyko breathing technique was combined with progressive resistance training; in Group II, it was combined with regressive resistance training; in Group III, it was combined with fluctuating resistance training; and Group IV served as the control.

4) The training period's duration will be limited to twelve weeks, and there will only be four sessions per week.

5) The following variables will be selected for this study:

*Dependent variables:

Physical variables:
i) Max Strength ii) Explosive Power iii) Muscular Strength Endurance

Physiological variables:
i) FEV1 (Forced Expiratory Volume in one second) ii) FVC (Forced Vital Capacity)
iii) FEV1 / FVC (Ratio between Forced Expiratory volumes in one second and Forced Vital Capacity).

Independent variables:

a) Twelve weeks buteyko breathing technique with progressive resistance training.
b) Twelve weeks buteyko breathing technique with regressive resistance training
c) Twelve weeks buteyko breathing technique with fluctuated resistance training.

6) All the selected physical and physiological variables will be assessed by the researcher himself and field experts.

7) Data on specific criteria variables will be gathered as pre-tests and post-tests, respectively, before and right after the experimental session.

LIMITATIONS

The following restrictions will be considered.

1) The individuals' prior involvement in sports and games, which could affect training and data,

will not be considered.

2) It is impossible to manage psychological variables, eating patterns, sleep patterns, lifestyle choices, etc.

3) The weather during training and testing times, including atmospheric temperature, humidity, and other meteorological aspects, will not be considered either.

4) Despite verbal motivation, no effort will be made to distinguish between the individuals' degrees of motivation throughout the training and testing phases.

HYPOTHESES

The following hypothesis will be drawn for this study,

1. There will be a significant effect of buteyko breathing technique with progressive resistance, regressive resistance and fluctuated resistance on selected physical variables in handball players.
2. There will be a significant effect of buteyko breathing technique with progressive resistance, regressive resistance and fluctuated resistance on selected physiological variables in handball players.
3. There will be a significant difference in experimental groups and control group after applying training interventions on selected physical variables in handball players.
4. There will be a significant difference in experimental groups and control group after applying training interventions on selected physiological variables in handball players.

5. RESEARCH METHODOLOGY

SELECTION OF SUBJECTS

Forty (N=40) National Level Handball players from throughout India will be chosen at random by the investigator. Four equal groups of ten (n=10) each will be formed from the chosen subjects: experimental group I (n=10), experimental group II (n=10), experimental group III (n=10), and group IV will serve as the control group (n=10). The individuals' ages ranged from 20 to 25 years old. For 12 weeks, the experimental groups will be subjected to a training regimen. Resistance training that is progressive, regressive, and fluctuating will be used to treat the experimental groups using the Buteyko breathing technique. Regular handball training was the sole activity given to the control group.

SELECTION OF VARIABLES

The researcher looked at books, journals, periodicals, magazines, and research papers that discussed Buteyko breathing, progressive resistance training, regressive resistance training, and fluctuating resistance training. The following variables will be chosen based on the instrument's availability, feasibility criteria, and the study's variables' significance.

Dependent Variables

Physical variables: 1) Maximum Strength

2) Explosive Power

3) Muscular Strength Endurance

Physiological variables: 1) FEV1 (Forced Expiratory Volume in one second)

2) FVC (Forced Vital Capacity)

3) FEV1 / FVC (Ratio between Forced Expiratory volumes in one second and Forced Vital Capacity).

Independent Variables

1. twelve weeks buteyko breathing technique with progressive resistance training.

2. twelve weeks buteyko breathing technique with regressive resistance training

3. twelve weeks buteyko breathing technique with fluctuated resistance training.

EXPERIMENTAL DESIGN

The study will use a pre- and post-randomized group design as its research design. From all throughout India, forty (N=40) national level handball players will be chosen at random. The chosen participants will be split into four groups at random and given buteyko breathing technique and progressive resistance training for 12 weeks (Group I), buteyko breathing technique and regressive resistance training for 12 weeks (Group II), buteyko breathing technique and fluctuated resistance training for 12 weeks (Group III) and control group didn’t undergo any treatment (Group IV). Each group will consist of Ten (n=10) subjects. For a

duration of 12 weeks, all three experimental groups will engage in consistent handball training. All subjects will undergo another measurement of the chosen criterion variables following the conclusion of the experimental session. The effect of each therapy on the individuals will be determined by comparing the starting and end means on the criteria variables. ANCOVA will be used to evaluate the collected data to determine whether the difference is statistically significant. The hypothesis will always be tested at the 0.05 level.

PRE AND POST RANDOMIZED GROUP DESIGN

R1	O1	T1	O2
R2	O3	T2	O4
R3	O5	T3	O6
R4	O7	-	O8

O – Signifies an observation in terms of pretest and posttest

T – Signifies training program for Buteyko breathing technique with progressive, regressive and fluctuated resistance groups.

R- Signifies the number of groups.

CRITERION MEASURES

The following standardized tests will be utilized to gather information on specific bio motor, physiological, and performance-related factors in accordance with the body of existing literature and expert advice. Equipment and standardized tests will be used to measure the chosen criteria variables. Table I will list the units of measurement, test item, and criteria variables that were chosen.

TABLE 1: CRITERION MEASURES

S. NO.	SELECTED COMPONENTS	CRITERION VARIABLES	TESTING EQUIPMENTS	UNIT OF MEASUREMENT
1.	**Physical variables**	Max. Strength	1RM test	In Kilograms
		Explosive Power	Standing Broad Jump	In meters
		Muscular Strength Endurance	Sit Ups test	counts
2.	**Physiological variables**	FEV1	Spirometry	Liters or milliliters
		FVC	Spirometry	Liters or milliliters
		FEV1 / FVC	Spirometry	Liters or milliliters

RELIABILITY OF DATA

By proving the instrument, tester, and subject reliability, the data's dependability will be guaranteed.

INSTRUMENT RELIABILITY

Certain factors will be measured using tools like spirometry. The instruments ought to be in good operating order. Their calibrations will be examined and determined to be sufficiently accurate for the study's needs. The instruments will receive certificates of accuracy from the relevant instrument testing organizations. Where necessary, the scale will be recalibrated using different amounts of variables. Measurements on each of the variable tests will be made five times with the same instrument under comparable circumstances in order to assess the instruments' dependability. As a result, their calibrations will be deemed sufficient for the study's purposes.

TESTER'S RELIABILITY

Under the supervision of the relevant professionals, the investigator will conduct multiple practice sessions in the testing procedure to guarantee the consistency and dependability of the testing technique. All measures for the study should be taken by the researcher with the help of qualified specialists. The test-retest procedure will determine the tester's dependability. The tester will correlate the subject data in order to ascertain the measurement's reliability for the study. To guarantee the consistency of the results, care will be taken to confirm each subject's fitness prior to each test being administered.

ORIENTATION TO THE SUBJECTS

The investigator informed the subjects of the training program's goal and their role in the study to collect data. The researcher provided directions on the points and methods that the participants should follow for measuring, as well as an explanation of the test procedures on the chosen criterion variables. To acquaint the participants with the methods for performing the Buteyko breathing and other resistance training regimens, three sessions will be held. They will use it to prevent injuries and ensure the execution of the Buteyko breathing and various resistance training programs. Verbal encouragement will be used to encourage the participants to consistently attend the training sessions. Additionally, until the completion of the study period, the control group will get explicit instructions to refrain from participating in any special training programs. Throughout the training and testing phases, the individuals in each group will receive sufficient motivation to give their best effort.

TRAINING PROGRAMME

Throughout the training session, Group I experienced Buteyko breathing technique with progressive resistance training, Group II underwent Buteyko breathing technique with Regressive resistance training, Group III underwent Buteyko breathing technique with Fluctuated resistance training and Group IV underwent regular handball training respectively for week for twelve weeks of the training program. The Overload, decreasing load and Fluctuated Load principle will be adopted. The workout in the daily training session, which included limbering down and warming up, lasted roughly 45 to an hour. Apart from their usual handball training, Group IV served as the control group and did not engage in any training regimen or physically demanding activities. Under the researcher's guidance, each experimental group completed their training regimen. Throughout the training program, the

individuals will be closely observed and asked about their health.

Resistance Training – Power Lifting Components will be used for resistance training.

- Bench Press, Back Squats and Deadlifts.

COLLECTION OF THE DATA

The 1RM strength test, spirometry, sit-ups, and standing broad jump tests will be used to measure the physical and physiological variables, including strength, explosive power, muscular strength endurance, FEV1 (forced expiratory volume in one second), FVC (forced vital capacity), and FEV1 / FVC (ratio between forced expiratory volumes in one second and forced vital capacity). Two days prior to the training program, pre-test data will be gathered, and two days following the final training session, post-test data will be gathered.

ADMINISTRATION OF THE TESTS

Before the tests are administered, the subjects will meet with the investigator. They will be given a thorough explanation of the study's goal, importance, and testing procedure needs so that they won't have any doubts about the work they must do to pass the exams.

Variables to be tested:

*** Physiological Parameters**

LUNG FUNCTION

Test- Spirometry

Spirometry is the method of testing various lung functions. It is a portable, noninvasive, easy and reproducible procedure which gives accurate results. It is used to assess present status for diagnostic or comparative purpose or for screening of various lung functions. It helps to diagnose various obstructive and restrictive lung diseases. In this study the equipment researcher is going to use for assessment of lung function is MEDSPIRO (Tentative). It is a portable digitalized instrument with a low-cost high performance with a high accuracy of results. The PFT will be performed by a trained technician. All the subjects will be explained properly. The baseline data and post breathing exercise data will be taken. The test will be repeated three times and the highest values will be taken for data analysis.

Prior to assessment weight and height with shoe off will be taken for all the subjects, and their age, sex and race entered in the spirometer. Assessment of All participants will be taken in sitting position and following parameters will be taken:

• FVC

• FEVI

• FEV1/FVC

Subjects will be in sitting position. For FVC (forced vital capacity) they will be asked to breathe in and out normally. Then asked to keep mouthpiece of spirometer in mouth and asked to inhale as maximum as they can, followed by a complete forceful rapid exhalation maximum as possible. For FEV1, which is the forced expiratory volume in 1st second of FVC will be measured and FEV1/FVC ratio is compared.

***Physical Parameters**

STRENGTH

ASSESSMENT: 1-RM Bench Press Exam

PURPOSE: To gauge the chest muscular groups' maximal strength. A safety bench, a bar, and a variety of free weights are necessary.

PROCEDURE: The participant needs to warm up sufficiently. As an illustration, warm up with 5–10 repetitions of a light–to-moderate weight, then do two harder warm-up sets of 2–5 repetitions, resting for 2 minutes in between. After two to four minutes of rest, the patient should execute the one-rep-max attempt correctly. If the lift goes well, take another two to four minutes to relax, then try another lift with a 5–10% increase in load. Rest for two to four minutes and try a weight that is 2.5 to 5% lighter if the patient is unable to complete the lift with proper technique. Continue adjusting the weight until the maximum lift is achieved.

After the warm-up set, choosing the beginning weight is essential to achieving the maximum lift in about five tries.

SCORING: The most weight that can be lifted is noted.

MUSCULAR STRENGTH ENDURANCE

Test: Sit-ups

PURPOSE: The test's objective was to assess the participants' muscular strength endurance

EQUIPMENTS REQUIRED: Mat, Floor, Stopwatch.

PROCEDURE: The student laid on his back with his heels no more than 12 inches from his buttocks, his feet on the floor, and his knees bent. The knees would be at a 90-degree angle. With their elbows on the surface and their fingers clasped, the subject's hands will be on the back of their neck. The pupil curled up to connect his elbows to his knees, bringing his head and elbows forward by contracting his abdominal muscles. One sit-up was the result of the action. The score for the sit-up performance is 60 seconds after the student returned to the starting position with his elbows on the surface.

SCORING: -ups performed in 60 seconds.

LEG EXPLOSIVE POWER

TEST: Standing Broad Jump Test

GOAL: To evaluate leg strength.

EQUIPMENT: A measuring tape and jumping pit were used.

PROCEDURE: The participant was instructed to stand behind the starting line with their feet parallel to one another. They were then instructed to bend their knees, swing their arms, and jump as far forward as they could. Three trials with sufficient rest were conducted.

SCORING: The score was calculated as the separation between the starting point and the closest landing spot. The final score was the best of the three trials (Johnson and Nelson, 1982).

STATISTICAL TECHNIQUE

Analysis of Covariance (ANCOVA) and descriptive statistics will be used to analyze the data Since four groups will be compared, and further appropriate statistical technique will be used after the data collection if needed. The 0.05 level of significance will always be set as the appropriate level. If the adjusted posttest's F ratio is determined to be significant, the LSD test will be used as a post hoc test to determine whether there are any paired mean differences. In every instance, a 0.05 level of confidence will be established to test for significance, which will be deemed suitable.

6 EXPECTED OUTCOMES OF THE RESEARCH

1) The goal of physical education research is to assist sports and physical education professionals in training their athletes using innovative ideas to enhance their performance.
2) By combining the effects of the Buteyko breathing technique with various resistance training methods, the study would advance our understanding of progressive, fluctuating, and regressive resistance training.
3) The study's findings might offer benchmarks for handball players at the national level in several specific physical and physiological areas.
4) The study's findings will influence how handball players at the national level are trained based on physiological, and physical characteristics.
5) This study may inspire other experts and academics to do related research to provide fresh insight into the topic.

REFERENCES

Arul, A., et al. (2008). Effects of progressive and fluctuated weight training on leg strength. *Journal of Sports Sciences, 32*(5), 321–329.

Arnheim, D. D. (1985). *Principles of athletic training: A competency-based approach* (4th ed.). Mosby.

Baechle, T. R., & Earle, R. W. (2008). *Essentials of strength training and conditioning* (3rd ed.). Human Kinetics.

Baechle, T. R. (1994). *Essentials of strength training and conditioning*. Human Kinetics.

Behm, D. G., Faigenbaum, A. D., Falk, B., & Klentrou, P. (2010). Canadian Society for Exercise Physiology position paper: Resistance training in children and adolescents. *Applied Physiology, Nutrition, and Metabolism, 33*(3), 547–561. https://doi.org/10.1139/H08-020

Bucher, C. A., & Lavorath, W. (1964). *Foundations of physical education* (2nd ed.). C. V. Mosby Company.

Chaouachi, A., Brughelli, M., Chamari, K., Levin, G. T., Abdelkrim, N. B., Laurencelle, L., & Castagna, C. (2009). Lower limb maximal dynamic strength and agility determinants in elite basketball players. *Journal of Strength and Conditioning Research, 23*(5), 1570–1577. https://doi.org/10.1519/JSC.0b013e3181a4e7f0

Cristea, A., et al. (2008). Effects of progressive strength and sprint training on muscle contraction regulation in older athletes. *European Journal of Applied Physiology, 102*(4), 335–344.

Daniels, J., & Scardina, N. (1984). Interval training and performance. *Sports Medicine, 1*, 327–334.

Dani, A. (2017). The effect of Buteyko breathing technique in improving cardiorespiratory endurance. *ISETH Totok Budi S*, ISSN 2477–332.

Fleck, S. J., & Kraemer, W. J. (2014). *Designing resistance training programs* (4th ed.). Human Kinetics.

Ganesan, P. (2009). Importance of regular exercise. *Exercise for perfect health*. Retrieved from www.healthwith-diet.blogspot.com

Govindarajulu, N. (1991). The importance of health-related physical fitness through physical activities. Paper presented at the 3rd All India Physical Education Congress, Madras, 8–11 October.

Hermassi, S., Chelly, M. S., Bragazzi, N. L., Shephard, R. J., & Schwesig, R. (2011). Effects of 8-week in-season upper and lower limb heavy resistance training on the peak power, throwing velocity, and sprint performance of elite male handball players. *Journal of Sports Sciences, 29*(5), 507–514. https://doi.org/10.1080/02640414.2010.543914

Jerath, R., Edry, J. W., Barnes, V. A., & Jerath, V. (2006). Physiology of long pranayamic breathing: Neural respiratory elements may provide a mechanism that explains how slow deep breathing shifts the autonomic nervous system. *Medical Hypotheses, 67*(3), 566–571. https://doi.org/10.1016/j.mehy.2006.02.042

Kido, K., et al. (2013). Effects of combined training with breathing resistance on endurance capacity and respiratory muscle function. *Journal of Applied Physiology, 115*(2), 220–228.

Kim, K., et al. (2019). Effects of elastic-band resistance exercises combined with breathing techniques on pulmonary function in senior women. *Journal of Geriatric Physical Therapy, 42*(1), 17–25.

Koubova, J., & Guarente, L. (2003). How does caloric restriction work? *Genes & Development, 17*(3), 313–321. https://doi.org/10.1101/gad.1052903

Kraemer, W. J., & Ratamess, N. A. (2004). Fundamentals of resistance training: Progression and exercise prescription. *Medicine & Science in Sports & Exercise, 36*(4), 674–688. https://doi.org/10.1249/01.MSS.0000121945.36635.61

Ma, X., Yue, Z. Q., Gong, Z. Q., Zhang, H., Duan, N. Y., Shi, Y. T., Wei, G. X., & Li, Y. F. (2017). The effect of diaphragmatic breathing on attention, negative affect and stress in healthy adults. *Frontiers in Psychology, 8*, 874. https://doi.org/10.3389/fpsyg.2017.00874

Rana. (2019). Changes in lung function measures following Bhastrika Pranayama (Bellows Breath) and running in healthy individuals. *International Journal of Yoga, 12*(3), 233–239.

Ratamess, N. A., et al. (2009). ACSM position stand: Progression models in resistance training for healthy adults. *Medicine & Science in Sports & Exercise, 41*(3), 687–708. https://doi.org/10.1249/MSS.0b013e3181915670

Rashmi. (2018). A study on immediate effect of Buteyko breathing technique during submaximal exercise on cardio-respiratory parameters in young adults. *International Journal of Health Sciences and Research, 8*(12).

Reddy, A., et al. (2015). Effects of progressive, fluctuated, and regressive complex training on explosive power in men. *Journal of Sports Science & Medicine, 14*(3), 214–222.

Romella, A. (2014). Effectiveness of Buteyko method in improving asthma control and quality of life in children. *Pediatric Asthma, 27*(2), 160–167.

Singh, H. (1984). *Sports training*. Netaji Subhas National Institute of Sports.

Stone, M. H., Stone, M., & Sands, W. A. (2000). *Principles and practice of resistance training*. Human Kinetics.

Taylor, N. F., Dodd, K. J., & Damiano, D. L. (2005). Progressive resistance exercise in physical therapy: A summary of systematic reviews. *Physical Therapy, 85*(11), 1208–1223.

Taylor, N. F., Dodd, K. J., Shields, N., & Bruder, A. (2005). Therapeutic exercise in physiotherapy: A summary of systematic reviews. *Australian Journal of Physiotherapy, 51*(2), 120–121. https://doi.org/10.1016/S0004-9514(05)70046-8

Van Etten, L. M., et al. (1997). Effect of an 18-wk weight-training program on energy expenditure and physical activity. *Journal of Applied Physiology, 82*(1).

Venkatesan, S., et al. (2012). Comparison of Buteyko and Pranayama breathing techniques on asthma quality of life: A randomized controlled trial. *Journal of Asthma, 49*(7), 614–621.

Westcott, W. L. (2012). Resistance training is medicine: Effects of strength training on health. *Current Sports Medicine Reports, 11*(4), 209–216. https://doi.org/10.1249/JSR.0b013e31825dabb8